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ABSTRACT

A total of 47 6-year-old children listened to stories after which they either constructed pictorial representations of those stories from a set of backgrounds and cut-out figures and objects, or they spent equivalent time classifying geometric figures. The pictorial elaboration task inhibited recall of the stories. This contrasts with results showing facilitation of paired-associate learning in which the same type of elaboration facilitates learning. Since imagery does facilitate learning in fourth-grade children, the present results suggest a developmental trend in the development of elaboration as a cognitive skill. (Author/CS)

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PICTORIAL ELABORATION OF PROSE TEXT BY FIRST-GRADERS[1, 2]

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Increasing amounts of evidence show the superiority of imagery over verbal practice in the recall of both children and adults. A picture that describes an event in which two referents of noun pairs take part is apparently more explicit and effective as a memory aid than a sentence in which the two nouns are embedded (Reese, 1970; Paivio, 1969; Bower, 1972; Rohwer, 1973). The effect of imagery practice upon sentence memory is also evident. Anderson and Hidde (1971) showed that adults' memory of words within a sentence is improved when people are instructed to form images of the events described in the sentences.

Children below a certain age are generally less able than older children and adults to benefit in their recall from imagery instruction (Piaget & Inhelder, 1971). Indeed, Levin, Davidson, Wolf, and Citron (1973) found that fifth-graders were able to benefit from generating their own images, but Montague (1970) indicated that first-graders were not. Nevertheless, Wolf and Levin (1972) and Wolf, Levin, and Longbardy (1972) have shown that even the memory of small children, below

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the age of five or six, can be improved if the children are engaged in overt activity that symbolizes a particular event. The manipulation of pairs of objects apparently allows the formation of dynamic images which, in turn, increases recall.

In the area of prose learning, Anderson and Kulhavy (1972) found that those adults who reported forming mental images while reading a story remembered the story better than those who did not report imagery. Lesgold, Curtis, DeGood, Golinkoff, McCormick, and Shimron (1974) found that imagery instructions and the requirement of drawing a series of cartoons that illustrate a story can facilitate text recall of adults.

As far as children are concerned, Levin (1973) found that fourth-graders who studied a story, sentence by sentence, while forming mental images recalled the story better than their age-mates who observed pictures of the events described by the sentences, or just read the story. McCormick and Lesgold (1974) (also in Lesgold, et al, 1974) found that imagery instruction had an effect on the recall of third- and fourth-graders, if the instruction was accompanied by an extensive training procedure. When training was provided, children of this age who drew cartoons to illustrate episodes in a story could improve their memory for the text.

The present study was designed to detect the effect of imagery practice in prose learning of children in the first grade. Since children of this age may be hampered in their ability to draw pictures and also may not understand an instruction to image, a procedure was devised that allowed them to listen to a story and then to illustrate its content with a previously prepared background and cut-outs.

Pictures have been shown to have a facilitative effect upon recall of older children (Matz & Rohwer, 1971). Manipulation of objects has been shown to facilitate memory of nouns in paired associate tasks given to children in the first grade and kindergarten (Wolf & Levin,

1972). Thus, it was expected that a combination of these two conditions would also have a positive effect on prose memory of children in the first grade.

Method

Materials. Five single-episode stories of 30-75 words were prepared to be easily understandable to six-year-old children. Each was recorded on tape. For each story, a background scene and a set of cut-out objects were prepared such that every action of the story could be illustrated with some of the cut-outs on the background. There were four background scenes (one of them was shared by two stories). The backgrounds and cut-outs were in color and were plastic-laminated.

Subjects. Forty-seven first-grade students particpated in this experiment. Twenty-three of them came from a campus laboratory school, while the remaining 24 came from an urban public school composed almost entirely of children from lower middle class Black families.

Subjects from the campus laboratory school were randomly assigned to either the picture or control conditions. For reasons relating to operating procedures at the urban public school, picture-condition subjects there came from one of two parallel classes, while control subjects came from the other (analysis of these students' standard achievement test scores showed no differences between classes).

Procedure. In the picture condition, the subject was asked to listen to the five stories in turn. After hearing a story, the subject was to select a background and some cut-outs, and illustrate the story content. These illustrations were photographed for later analysis, and then the pieces were put back into a standard arrangement with the others. After a control subject finished hearing a passage, he

spent an equivalent amount of time (two minutes) doing simple geometry problems (e.g., given a picture of a square and a picture of a circle, draw a picture of the one superimposed upon the other). After hearing every story and doing the picture or control task after each, the subject was given a clue for each story in turn and asked to retell the story without regard to its exact wording. The subject's recall was recorded on tape. Participants in both groups were told in advance that they would be asked to recall the stories later and, therefore, they should try to remember them carefully.

Scoring. Several procedures were developed for scoring the protocols. Basically, every predication (underlying proposition) and referent (noun) identifiable in the original story was searched for in each protocol and tallied as either recalled verbatim, recalled with correct meaning (synonym), incompletely recalled, overly specifically recalled, or not mentioned.

A more crude measure was also employed in which recall of the main idea of each passage was scored on a five-point scale. The picture constructed by the experimental subjects was also checked for five properties: (1) Was the correct background used? (2) Were items placed on the background appropriately (e.g., monkeys on monkey island rather than on picnic table)? (3) Was at least one cut-out chosen that portrayed a referent of the story? (4) Was the picture completely free of irrelevant (unmentioned object) cut-outs? and (5) Was the main idea expressed in the picture?

Results

The most important measurements were verbatim and synonymous recall. Summary means for these scores are shown in Table 1.

TABLE 1

Mean Percentage of Correct Recall

Verbatim or synonymous of predication recall:

	Picture	Control	Combined
Lab School	30.7	39.2	34.4
Public School	20.2	29.0	24.6
Combined	25.6	33.6	

Verbatim or synonymous of noun recall:

	Picture	Control	Combined
Lab School	49.4	59.6	53.8
Public School	36.6	53.3	44.9
Combined	43.2	56.1	

Main idea adequate:

	Picture	Control	Combined
Lab School	60	86	72
Public School	38	66	52
Combined	50	76	

Analyses of variance were performed on these scores, using School and Condition as between-subject independent variables. The results showed that subjects in the campus lab school had significantly better recall than those in the urban public school. Subjects in the picture condition remembered significantly worse than their control group. All School by Condition interactions were non-significant.

Another item of some interest is the rating of whether or not the main idea of the passage was recalled. It is possible for subjects in different treatments to get the main idea but to differ in whether or not

they recall details. That did not happen in the present study. Specifically, for each subject a score of zero to five was assigned, dependent upon the number of stories from which the main idea was judged to be adequately recalled. An analysis of variance of these scores showed a situation similar to the one revealed by predication recall: Scores for recalling the main idea were significantly higher for subjects in the campus lab school than for subjects in the urban public school, $F(1,43) = 5.61$, $p < .05$, and subjects in the picture condition had significantly less "main ideas" than those in the control group, $F(1,43) = 9.86$, $p < .01$, but no interaction, $F < 1$.

The final set of results concerns the quality of the actual pictures constructed by subjects in the picture condition. Each picture constructed for each story was photographed and later rated as described above (See Table 2). The campus lab school Ss tended to have more pictures meeting

TABLE 2

Data on Adequacy of Subjects' Pictures

	Correct Background	Items Placed Correctly	Some Relevant Items	No Irrelevant Items	Main Idea
Campus School (N = 13):					
Mean Percent Adequate	100%	89%	100%	89%	85%
No. of Ss Adequate on All Five Stories	13	7	13	8	4
Urban School (N = 12):					
Mean Percent Adequate	92%	72%	97%	68%	48%
No. of Ss Adequate on All Five Stories	9	4	11	2	1

the various criteria than the Ss in the urban public school. The differences between the two groups only approached significance, except for the large difference (85% vs. 48%) on whether or not the main idea of the story was represented in the picture, $z = 1.96$, $p < .05$. Nevertheless, when scores are cumulated by giving each subject one point for each of the five criteria passed on each of the five passages, the resulting picture scores are significantly higher for the campus lab school ($p < .05$) than for the urban public school (means = 23.2 vs. 18.8). Also, the picture quality scores correlate 0.51 with predication recall measure ($p < .01$).

Interestingly, picture adequacy for the experimental campus lab school subjects is between 85% and 100%. However, their control counterparts still do about 30% better on the various recall measures. This suggests that picture adequacy is not sufficient for memory adequacy even though it does correlate with text recall.

Discussion

Why is it that the picture construction in our experiment did not help our subjects to recall the stories? One possible reason is that, undeliberately, we posed an extensive interference in the experimental condition, since the subject had to choose a background and cut-outs from an array of four backgrounds and many cut-outs. It may be that this activity interfered with the subject's memory for the text. Occasionally Ss constructed a picture that was a bad representation of the story. Thus, inappropriate picture constructions may also have contributed to the deterioration of recall. In addition, listening to the story while choosing pictorial representations and planning a picture may have had the effect of creating a processing load problem that inhibited subjects' recall.

A test of this hypothesis has been carried out by the authors of this paper in collaboration with Levin and Gutman at the University of Wisconsin. In this experiment, only the appropriate background and cut-outs for each story were presented to the child while listening, followed by illustration. That way, the possibility of thinking about constructing a picture could not interfere with keeping track of the new information coming in. It was expected that this presentation, which included only the appropriate elements for each text, may even have resulted in a positive effect on memory, since more organized and more accurate text organization was possible. Analysis of the data confirmed this prediction. It thus appears that pictorial elaboration may facilitate memory of prose in the first grade if interference is carefully avoided and attention is exclusively directed to the appropriate pictorial elements.

Small children are easily distracted. Pictorial elaboration at this age may sometimes have the effect of directing the children's attention and evoking the correct imaginal representation. However, if not carefully administered, it may have the opposite effect. More research is required to better mark the borderline between the two circumstances.

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